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Another paper by the same authors[4] describes some experiments made to test the effects of desiccation on vitality of seeds. The seeds of grains and grasses will withstand drying to less than 1 per cent without material loss in germination. Blue grass and Johnson grass can even be dried to 0.1 per cent of moisture without loss in germination, but vigor is greatly reduced in the blue grass. Still further loss of vigor occurred in the blue grass when dried in vacuo at 100° C. for 6 hours, but the germination percentage was not materially reduced. These results negative the statements of EWART that excessive drying changes dormant protoplasm to such an extent that the essential molecular groupings cannot be re-established under conditions for germination.—C. A. SHULL.

Curing timber.—A method of drying timber more uniformly to avoid cracks and shakes in the logs is proposed by STONE.[5] The method is based upon assumptions as to the natural movement of sap in trees which will not meet with favor among plant physiologists. He considers that the water is held in the saturated tracheal walls, evaporates from these walls into continuous vapor-filled lumina, and moves upward through the tubes in response to a partial vacuum produced above by transpiration. Indeed, the water is supposed to travel upward mostly by night, because at that time the leaves are much cooler than the trunk, and would condense the vapor from the tubes, thus filling the cells as reservoirs against the next day's transpiration. Salts are imagined to travel through the cell walls of the tracheae rather than in the transpiration stream, which is nonexistent in STONE'S assumption. It is hard to imagine a conception much more at variance with experimental results of physiological studies.

The actual drying plant suggested is a closed shed, arranged with a cooler at one end, the purpose of which is to condense the moisture as it leaves the logs, in the form of hoar frost, on the principle of the dew pond. Thus the air of the shed will be kept continually dry, and cold dry air constantly circulating through and around the porous logs. He asserts that this would dry each annual layer simultaneously, and that the shrinkage would be regular and occur without cracking. Whether the proposed plant would really result in the uniform curing of timber the reviewer must leave to the practical forester. Perhaps the suggestion is much sounder on the practical side than the assumptions on which it is based would seem to indicate.—C. A. SHULL.

Philippine plant diseases.—REINKING[6] has published an excellent and very useful account of the economic plant diseases of the Philippines, which

[4] HARRINGTON, G. T., and CROCKER, WM., Resistance of seeds to desiccation. Jour. Agric. Research **14**:525–532. 1918.

[5] STONE, HERBERT, The ascent of the sap and the drying of timber. Quart. Jour. Forestry **12**:261–266. 1918.

[6] REINKING, OTTO A., Philippine economic plant diseases. Philipp. Jour. Sci. **13**:165–274. *pls. 20. figs. 43.* 1918.

will be welcomed by plant pathologists, especially those who are interested in tropical plant diseases. In the introduction the author states that the losses due to fungi are at least 10 per cent. He also states that "certain articles on phytopathology in the tropics give an entirely wrong impression of the number and destructiveness of the diseases." In the Malayan regions, at least so far as the Philippines are concerned, there are represented all groups of fungi that are present in the temperate regions. Extremely destructive diseases are produced by some of each group. It is very evident from this and other works that the diseases follow the host plants very closely. Agricultural plants, especially vegetables and truck crops that are very widely distributed, are attacked by the same pathogens, whether grown in the tropical or temperate zones. The coffee industry was at one time wiped out by a fungus, the cacao loss is about 50 per cent, and the rice losses are very heavy. The author lists 60 hosts of which about one-half are grown to a greater or less degree within the bounds of the United States, especially in the southern states or Pacific Coast states. There are a total of 339 diseases listed, many of which are found within the United States. The author gives brief but accurate descriptions of the symptoms, the causal organisms, and statements concerning the control measures. Ten pages are devoted to the discussion of spray mixtures and methods of control.—MEL T. COOK.

Root-nodules.—Miss SPRATT[7] has investigated the formation of root-nodules by *Bacillus radicicola*. The plants producing nodules when infected are sharply differentiated into 2 classes, legumes and non-legumes. In the Leguminosae the cortical cells respond to the stimulus, resulting in the nodule. In other plants the penetration of the bacteria into root-hairs and cortex induces no morphological change until a young lateral root is infected during its passage through the cortex, and as a consequence becomes swollen and forms the nodule. In other words, the root-tubercles of non-leguminous plants are modified lateral roots, while those of the legumes are exogenous in origin. A contrast in the structure of the 2 types of nodule is evident. In leguminous nodules the bacteroidal tissue is central, and the vascular system consists of a number of peripheral strands; while in the non-leguminous nodules the stele is central, retaining its connection with the root cylinder and growing point. In making a comparative study of the nodules of Leguminosae, Miss SPRATT recognizes 4 types, based chiefly upon the distribution of meristem, bacteroidal tissue, and vascular tissue, and these types are definite enough to characterize various groups of Leguminosae.

The author concludes that "the form of the nodule depends primarily on the nature of the environment of the host, which influences the cell-sap and consequently the behavior of the bacteria after they have entered, and secondarily on the anatomical peculiarities of the particular plant."—J. M. C.

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[7] SPRATT, ETHEL R., A comparative account of the root-nodules of the Leguminosae. Ann. Botany **33**:189–199. *pl. 13. figs. 5.* 1919.